

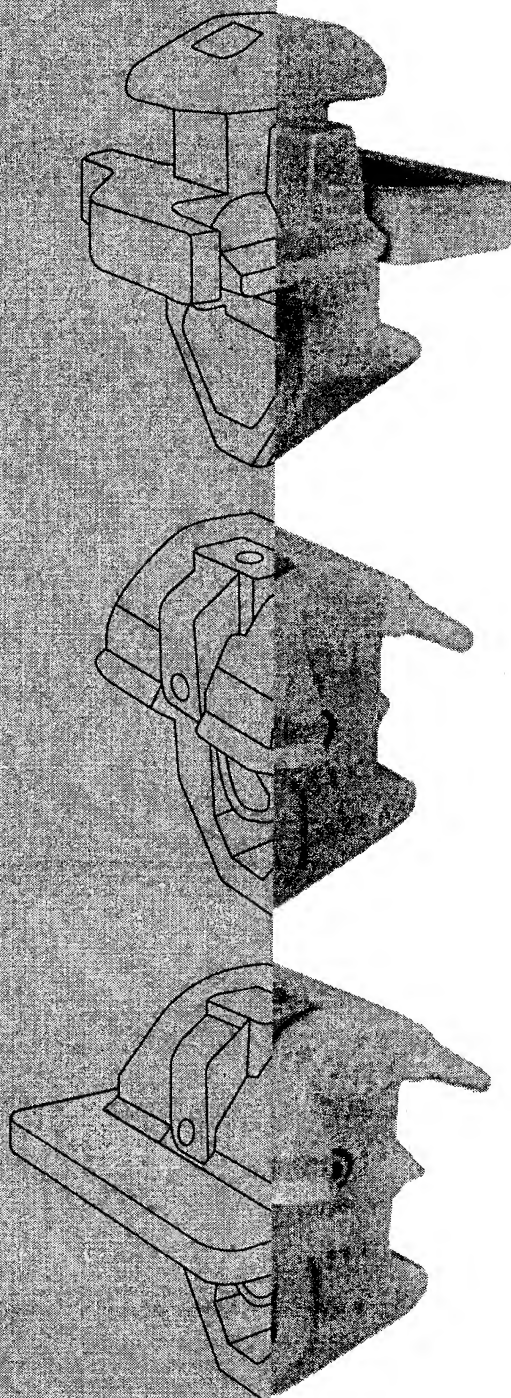
FULLY-AUTOMATIC TWISTLOCKS

CARGO SECURING SYSTEMS WORLDWIDE

TL-FA

TL-FA/LF

TL-FA/L

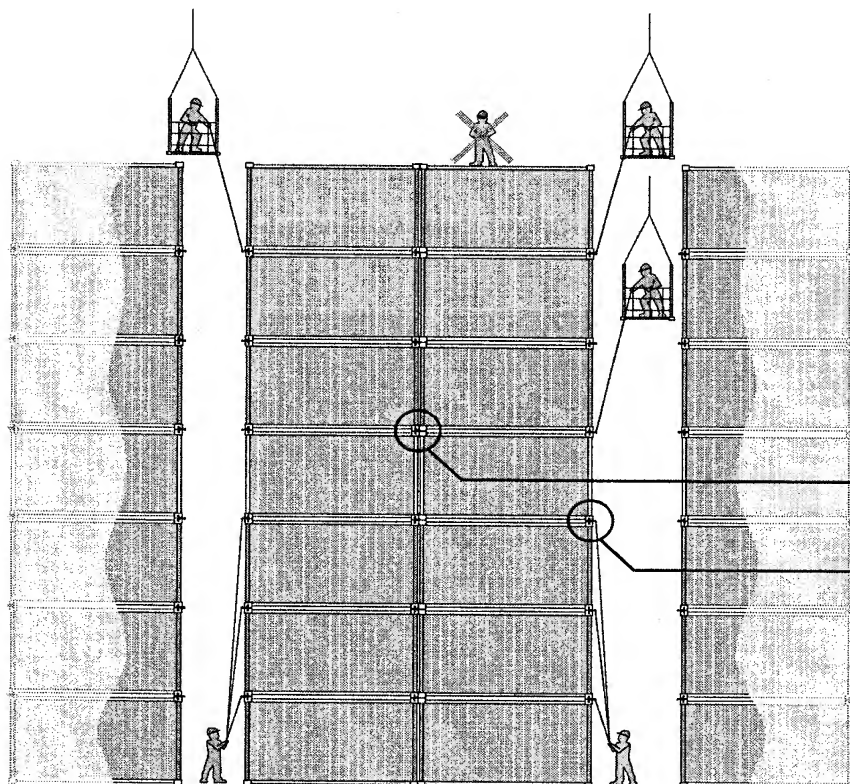


SEC

Ship's Equipment Centre Bremen GmbH

HANDLING PROCEDURE OF SEMI-AUTOMATIC TWISTLOCKS

Actual opening procedure of semi-automatic twistlocks in the terminal before being able to unload containers.

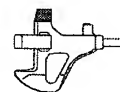


Case

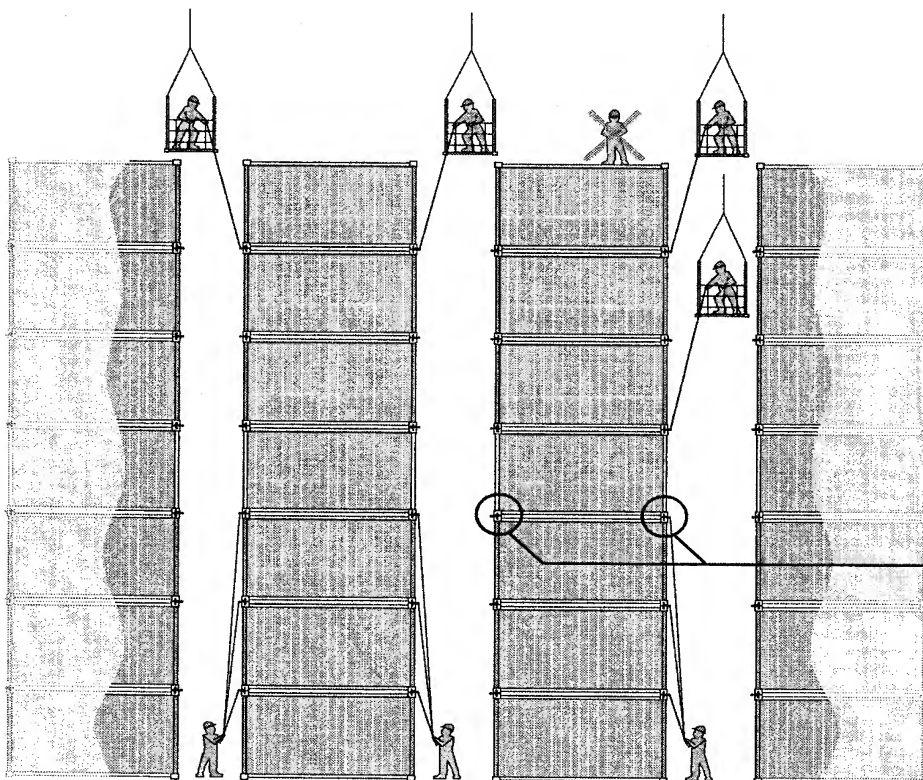
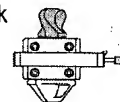
A

20' containers stowed with 76mm ISO-gap (block stowage)

Midlock



Semi-automatic twistlock

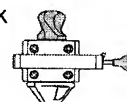


Case

B

20' containers stowed with lashing gap

Semi-automatic twistlock

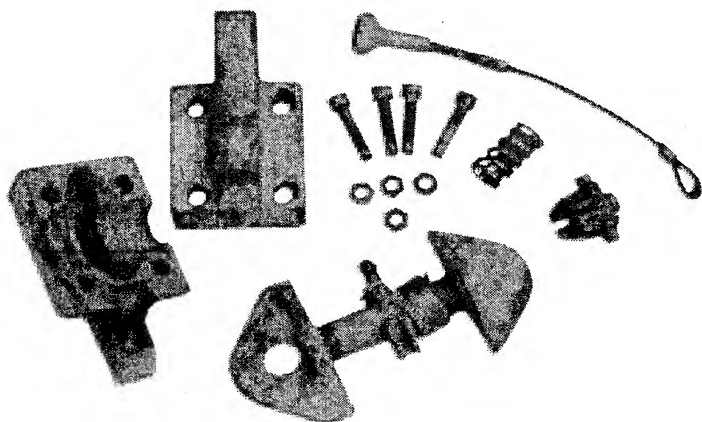


DESCRIPTION OF SEMI-AUTOMATIC TWISTLOCKS

Nowadays almost all modern container ships are equipped with semi-automatic Twistlocks in line with OSHA-requirements. These semi-automatic twistlocks, which have been developed in the early nineties of the last century, are locking automatically when loading the container on board but still have to be opened manually by stevedores from deck level or from safe working positions before the discharging operations can start.

Weaknesses of Semi-automatic twistlocks (SAT):

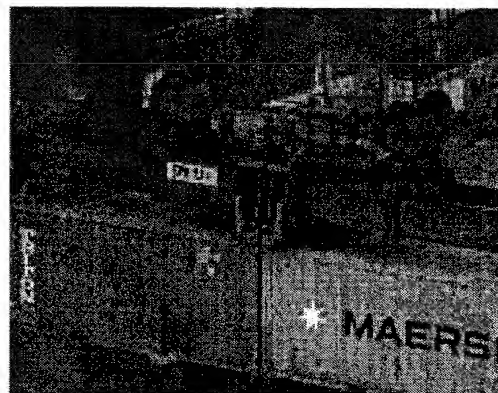
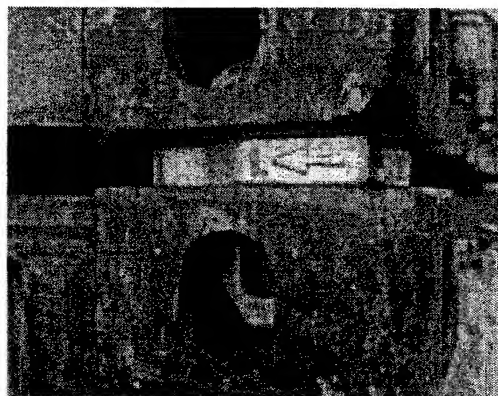
- It is impossible to open the SAT from deck level if the containers are stowed in 5 tiers or more. Then, the SAT to be opened by stevedores from top in a safe working position like man basket or special spreader devices. This procedure is very time consuming especially under bad weather conditions and during night time.
- Quite often SAT with broken pulling wires can be found caused by corrosion, insufficient greasing / maintenance or rough handling. As a result, the SAT tends to get stuck during the operation which will delay the discharging operations
- All SAT consist of many different components requiring permanent maintenance and even exchange of pulling wires. Such kind of repair is a complicated job because of the design itself with the loaded spring mechanism inside.



- On container ships where the 20'-containers are stowed with narrow ISO-gap (76 mm), the so called Midlocks have to be used in gap position because the pulling wire of SAT is not accessible in this location. Correspondingly, different types of twistlocks have to be used on board which lead to

● difficulties for the stevedores at quay side to find out which type to be used for which position.

● Additional requirement for spare parts and maintenance on board



SEC'S NEW DEVELOPED FULLY AUTOMATIC TWISTLOCK FAMILY

Recently, many contracts for the construction of the latest generation of ultra-large containerships were signed and a total ship's capacity of 10,000 TEU and above becomes reality. These container giants require many new technologies in order to boost the productivity compared to smaller vessels, e.g. when considering that containers are stowed in stacks of up to 8 tiers on deck.

Following the OSHA- Rules and Regulations in the United States, which were fully implemented in year 1999, longshoremen are not allowed to climb on top of containers in US- Terminals, hence all the operations of the container securing equipments to be done from deck level or from safe working positions without exceptions.

Commonly used semi-automatic twistlocks (SATs) are in line with these OSHA- rules and regulations but there are disadvantages which are described in the previous pages.

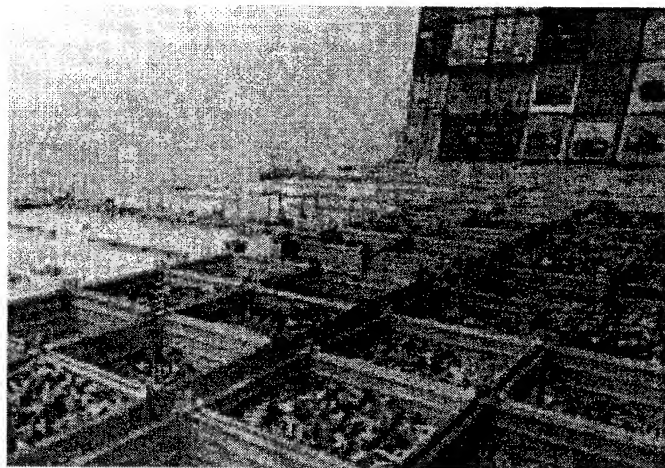
The company SHIP'S EQUIPMENT CENTRE BREMEN GmbH (SEC) is an international supplier of CARGO SECURING SYSTEMS and pays attention to this ongoing development by providing a new revolutionary Twistlock for containers stowed on deck.

The product-development project was launched early in 2002 and within a couple of months, SEC already developed a prototype of the Fully- Automatic Twistlock TL-FA which fulfilled all basic requirements in terms of handling and function. This prototype was presented to guests at the SMM- exhibition in Hamburg in September, 2002. After that, SEC concentrated on the fine-tuning of the design and applied for its approval with Germanischer Lloyd.

Finally in April 2003, Germanischer Lloyd approved the design, the operation features as well as the strength and safety of TL-FA without any objections. As a result, the new LOCK could prove its liability and proper function on board.

In autumn 2003, the first ship (700 TEU) received SEC's TL-FA for all deck container and the operation went smoothly without any problems. Meanwhile, many other shipowners decided to change to the TL-FA or to take it for the basic outfit for their latest new-buildings.

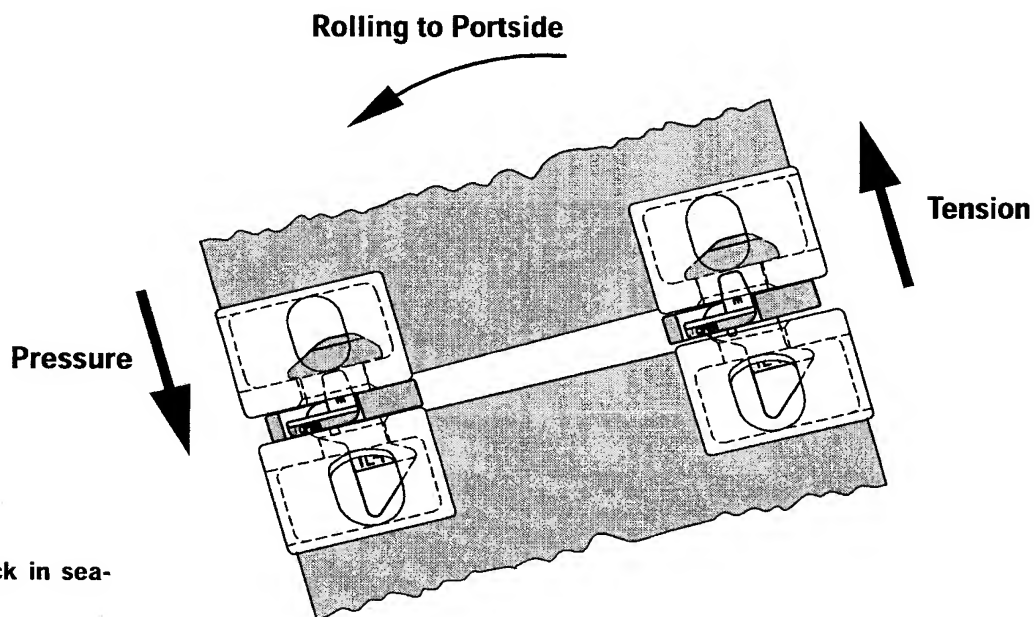
The feedback from the operation is very positive and the Twistlock has a very good chance to become a new international industry standard for safety and productivity in container handling.



FUNCTION OF SEC'S FULLY-AUTOMATIC TWISTLOCKS

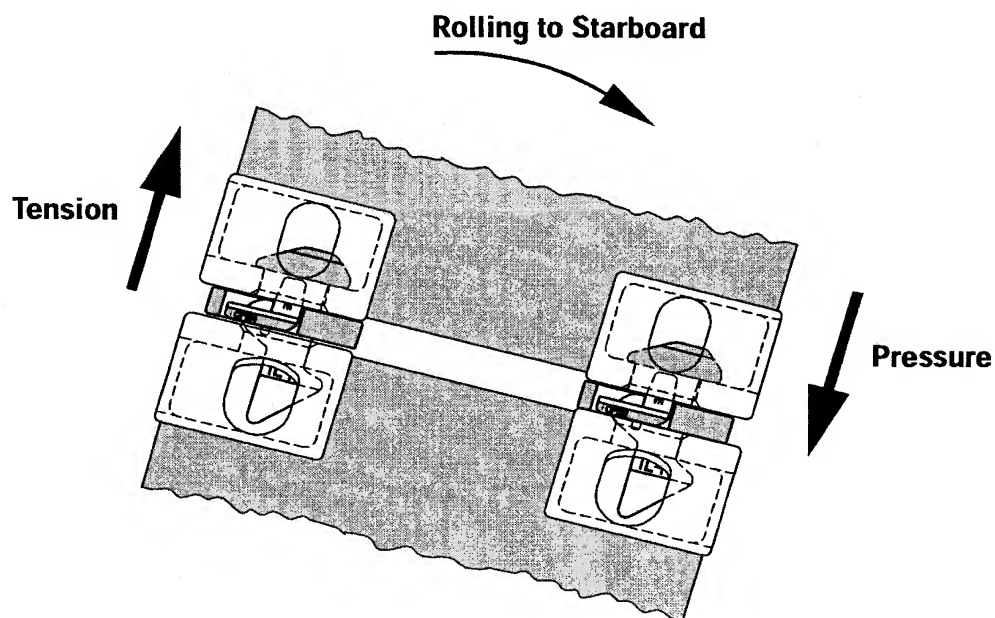
During ship's voyage/seagoing condition

The TL-FA is of special asymmetric design and its combination of inclined surfaces holds the containers safely in position during all expected operating conditions.



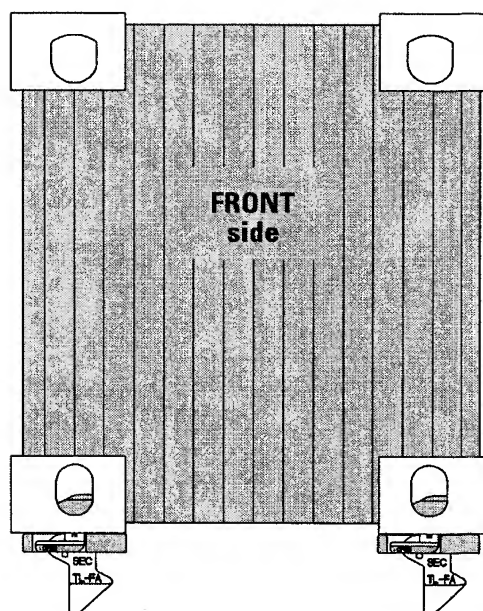
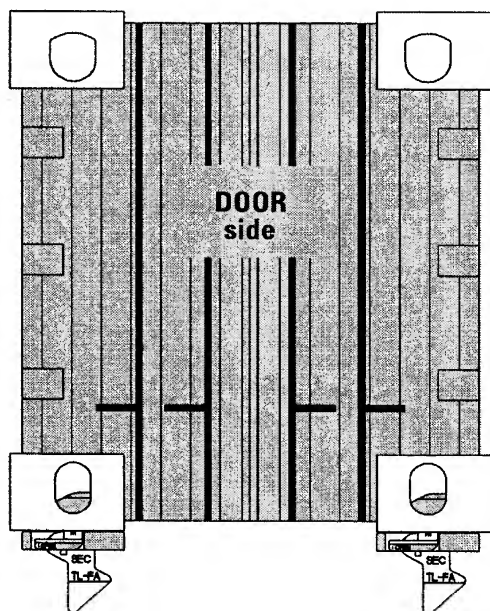
Fully-Automatic Twistlock in sea-going conditions

Pressure force on one side of the container prevents the Fully-Automatic Twistlock on opposite side to slip out of the corner casting.

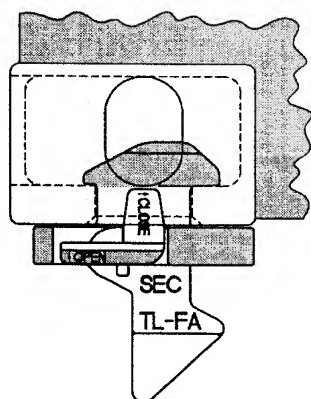


HANDLING OF FULLY-AUTOMATIC TWISTLOCKS

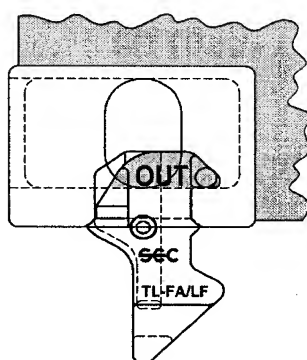
Fully-Automatic Twistlocks in final position for locking on board.



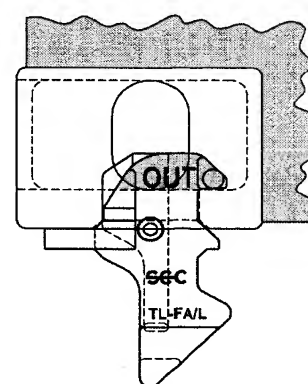
TL-FA



TL-FA/LF



TL-FA/L



OPERATION PRINCIPLES OF FULLY-AUTOMATIC TWISTLOCKS

During the loading of deck containers

The Twistlocks to be inserted in all 4 container corner castings at quayside and the container is lifted onboard. Due to the special shape of the fully-automatic twistlocks, the container is slightly slewing around its vertical axis when positioned to the lower deck container on board. After the lowering of container is completed, the Twistlock is self-locked.

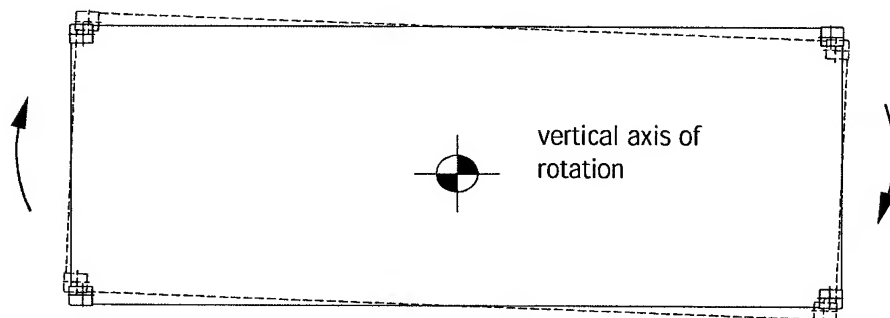
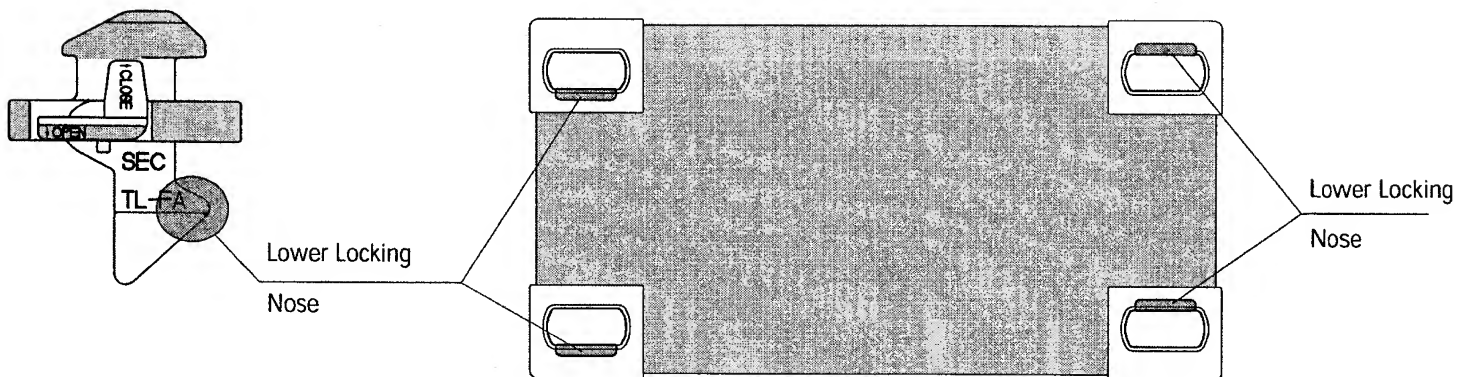
During the discharging of deck containers

Without any handling or operation of the fully-automatic twistlocks onboard, the container can be picked-up by crane or bridge. The lifting procedure starts again with the slight slew of container around its vertical axis and the container gets free from the lower one automatically.

All operations are performed by a universal "Twistlock" **without** any kind of manual activity by stevedores onboard!



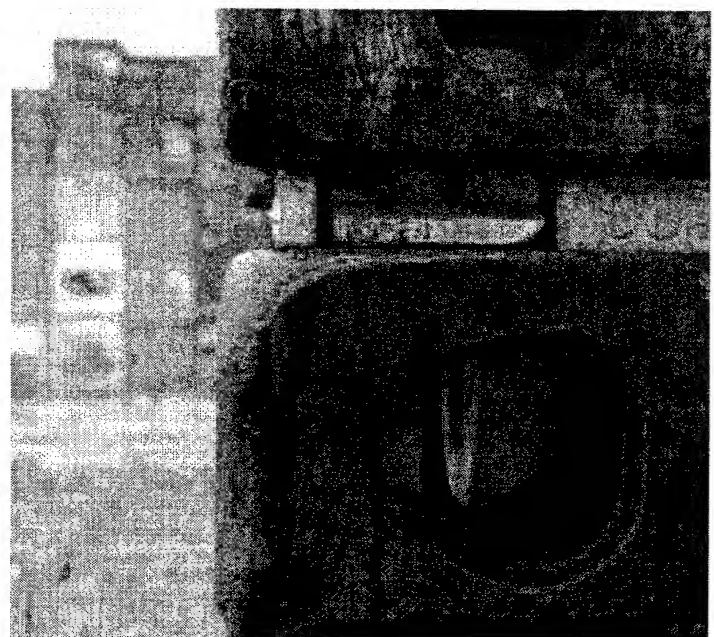
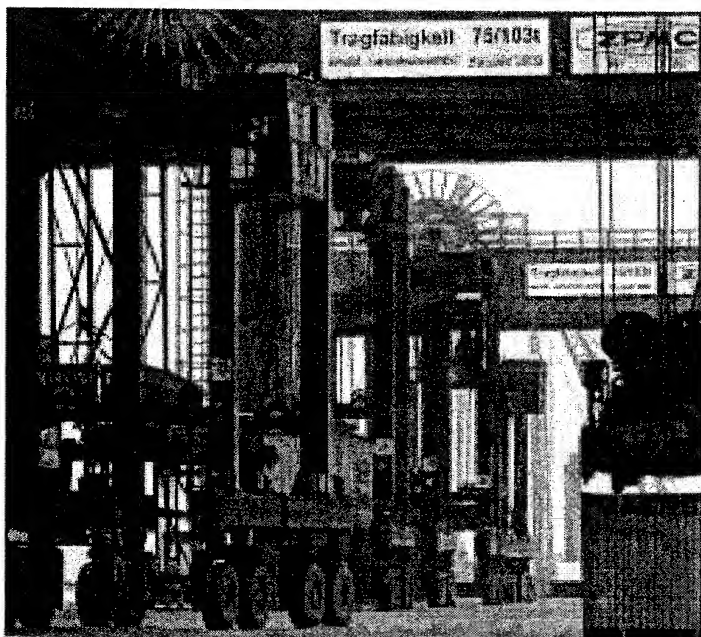
After inserting the Fully-Automatic Twistlock into the corner castings the position of the lower cone creates a rotation of the container on its vertical axis during loading and unloading.

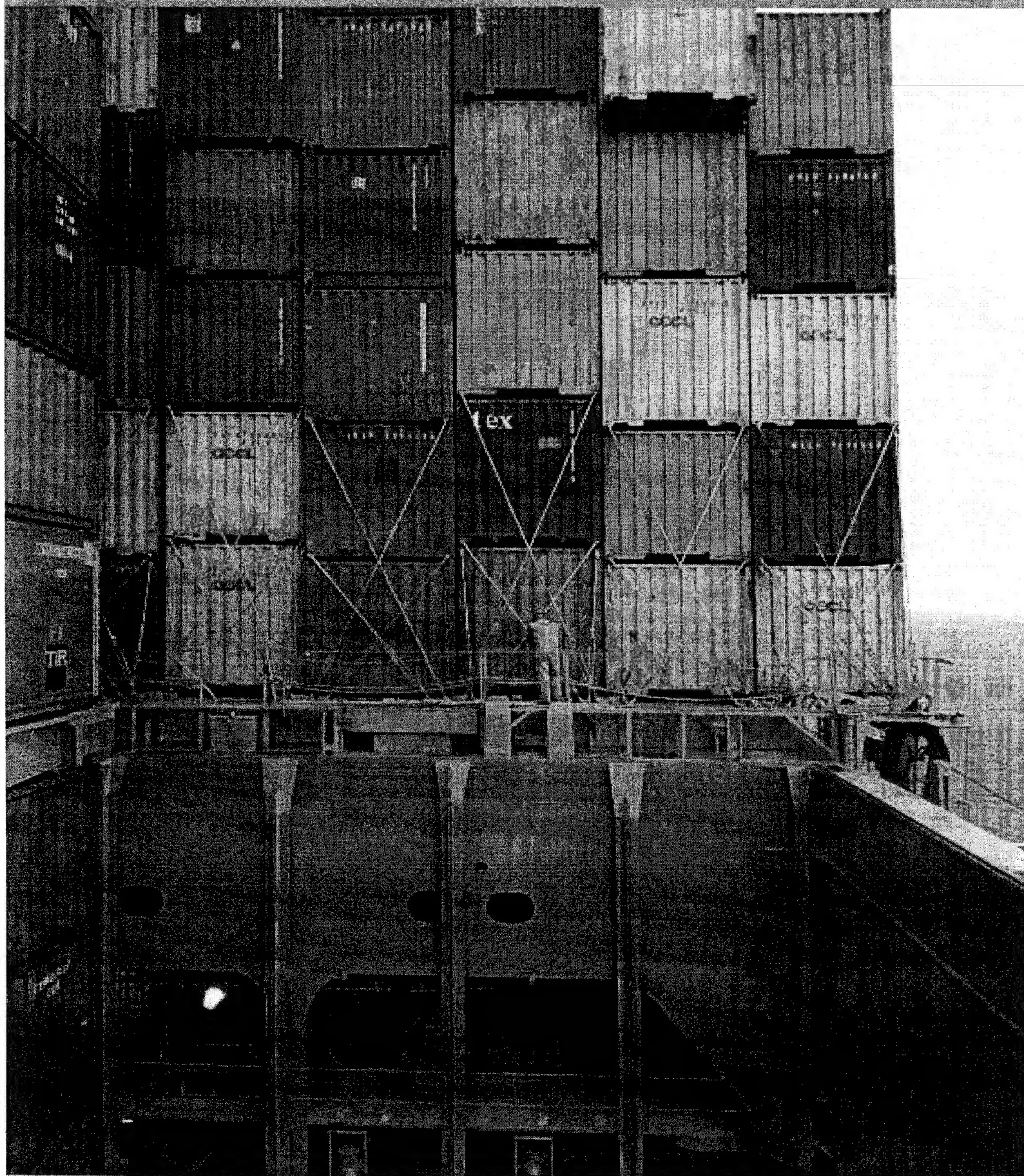


ADVANTAGES OF SEC S FULLY-AUTOMATIC TWISTLOCKS

Besides of the unique principles as described on the pages before, the **Fully-Automatic Twistlocks of SEC** fulfill highest requirements for operation, handling and maintenance. The advantages compared to other systems are as follows :

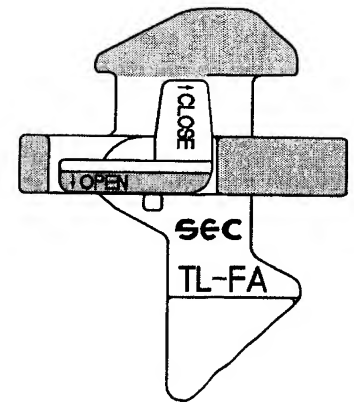
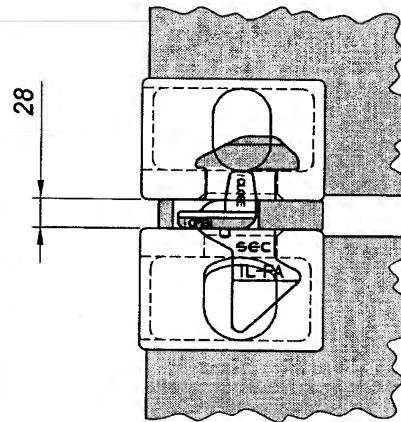
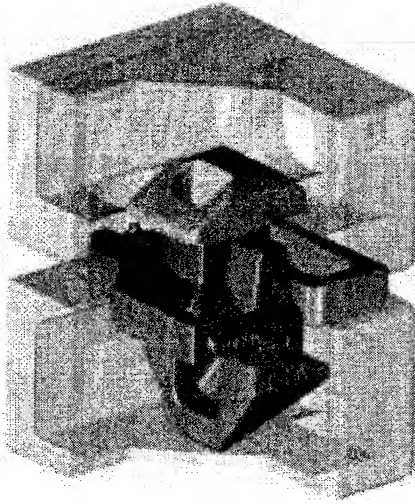
- In accordance with the OSHA- rules and requirements
- Single robust housing made of high tensile cast steel with large surface acc. to GERMANISCHER LLOYD for highest pressure forces.
- Easy maintenance! - The number of movable assembly parts is limited. The remaining assembly parts are protected by the Twistlock- body and do not protrude over the container corner castings while stowed. This avoids possible damages during the loading/discharging of adjacent containers.
- Well-known and easy handling (insertion & remove) from corner casting at quayside.
- No sensitive mechanism for definition "TWISTLOCK open/closed", i.e. our fully-automatic twistlocks work well independently from external influences like low temperatures, icy conditions, swell harbours, heel / trim, etc.
- Lashing bars can be inserted in the upper and lower container corner.
- When using any type of our fully-automatic twistlock family, the vertical movement between the containers is limited to 12 mm according to ISO 3874. This limitation avoids possible overloads on lashings.
- SEC's fully-automatic twistlocks work without any problems during the TWIN- LIFT of 2 x 20'- Container stowed longitudinally. This feature, in contradiction to the Twistlock- / Midlock- combination, ensures the simultaneous operation of 2 x 20'- Container in block stowage (with ISO- Gap) with significant cost savings in terminals!
- Best in class Price-/ Efficiency-Ratio for basic outfits as well as for the running supplies (Spare Parts). Due to the use of fully-automatic twistlocks, any kind of manual activity by stevedores on board is eliminated!



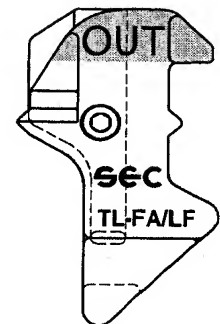
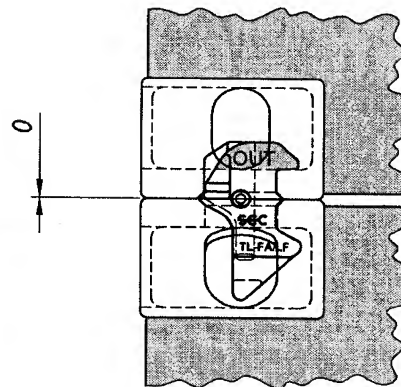
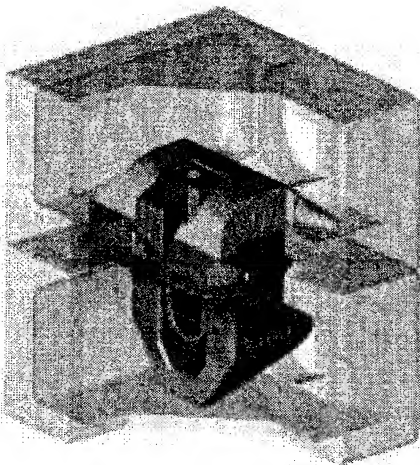


DIFFERENT TYPES OF FULLY-AUTOMATIC TWISTLOCKS

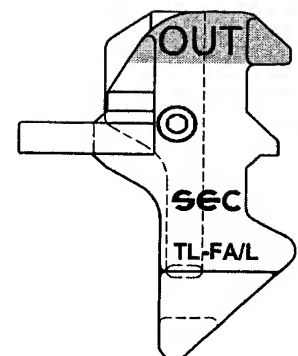
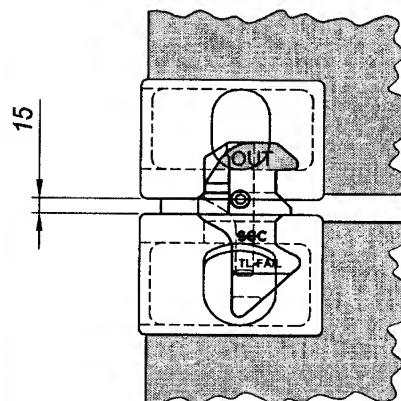
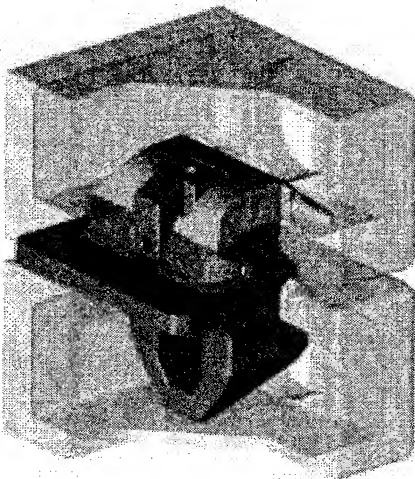
Vertical gap between containers.



~ 6.4 kg



~ 4.3 kg



~ 5.7 kg

● Original type TL-FA

- One piece housing made of high tensile cast steel
- Large resting area according GL rules for highest pressure forces
- No restrictions for the application of different lashing systems
- Replaces Semi-automatic twistlocks and Midlocks on existing vessels without re-checking length of lashing bars because flange thickness is same
- Can also be used in bottom tier when special foundations were installed
- Suitable for lifting by twin spreader
- Hot dip galvanised with stainless steel components

Disadvantages:

- Inserting TL-FA in opposite direction is possible!

● Flangeless type TL-FA/LF

- One piece housing made of high tensile cast steel
- No vertical gap between containers so that pressure forces are transmitted directly by the container corner castings
- When the containers are stowed directly on top of each other this has a positive effect on the centre of gravity of stack and ship's stability. The length of lashing bars can be reduced. Depending on the line of visibility probably the TEU capacity can be increased.
- In no case the TL-FA/LF can be inserted by stevedores in the wrong way which is prevented by the fixed pin, please compare to the next page
- Very competitive price because of minimized weight and missing flange
- No restrictions for the application of different lashing systems
- Maintenance of TL-FA/LF is not required at all
- Minimised stowage volume in the stowage bins is required
- Suitable for lifting with twin spreader
- Hot dip galvanised with stainless steel components

Disadvantages:

- From deck level it is impossible to control whether twistlocks have been inserted between upper tiers or not!
- Can be punched completely into the lower container corner casting
- Can be mixed up with twist stackers and used in cargo holds by mistake

● The ideal combination of both a. m. versions TL-FA/L

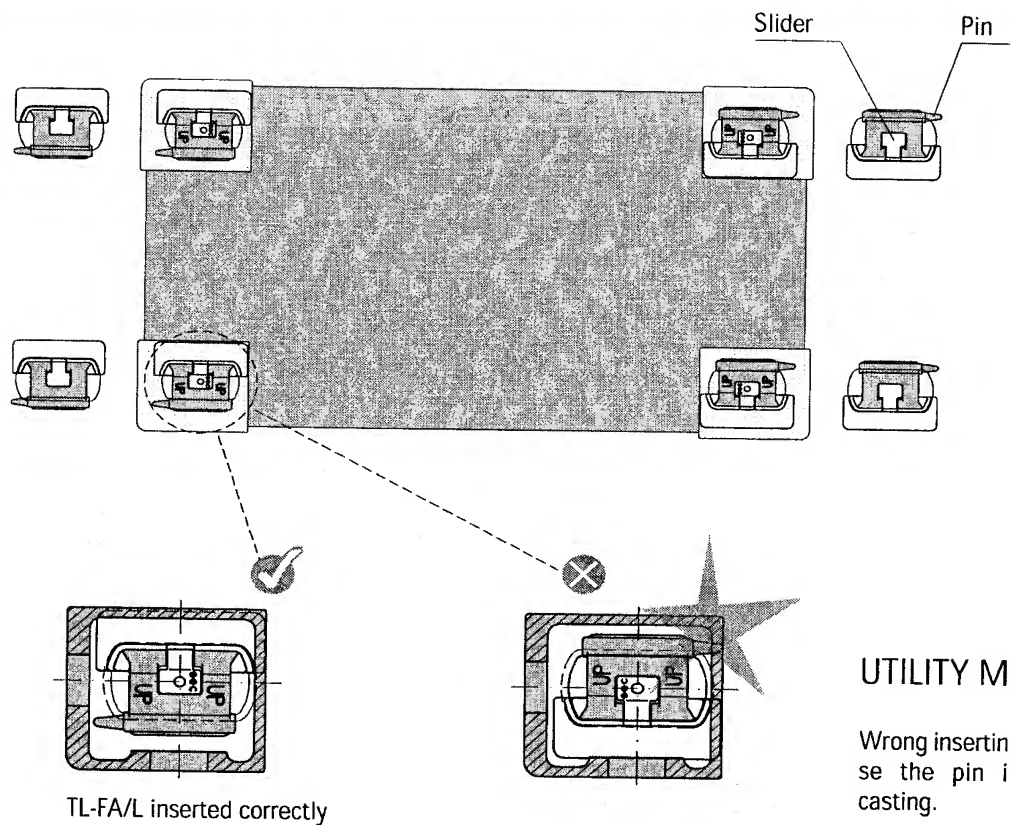
- One piece housing made of high tensile cast steel
- As a compromise between the other two solutions a flange thickness of 15mm has been applied, so there is a positive effect on the weight, ship's stability, length of lashing bars and centre of gravity of container stack.
- In contrast to the TL-FA/LF it can still be seen from deck level whether a TL-FA/L has been inserted between upper tiers or not.
- The 15mm flange safely prevents the TL-FA/L from being pressed into the corner casting during rough handling, for example when putting down the container on the pier with high crane speed.
- In no case the TL-FA/L can be inserted by stevedores in the wrong way which is prevented by the fixed pin, please compare to the next page
- Competitive price because of minimized weight and reduced flange thickness
- No restrictions for the application of different lashing systems
- Maintenance of TL-FA/L is not required at all
- Suitable for lifting with twin spreader
- Hot dip galvanised with stainless steel components

Disadvantages:

None

FUNCTION OF PIN

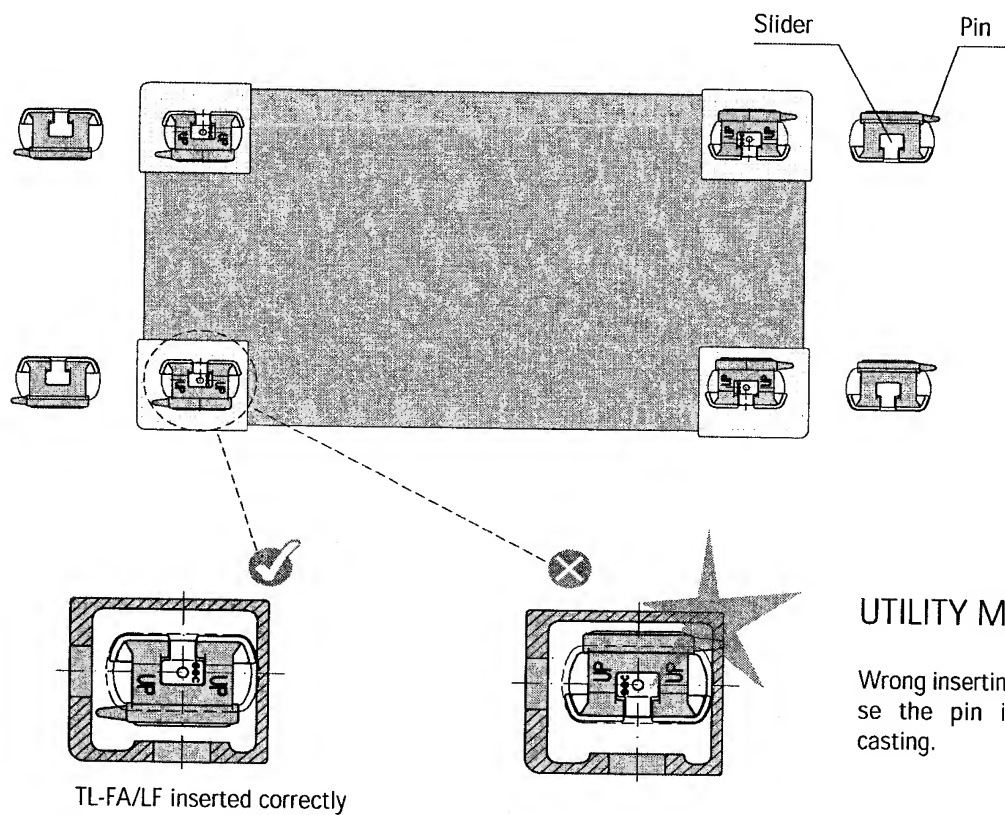
TL-FA/L



UTILITY MODEL*

Wrong inserting ist not possible because the pin interferes with corner casting.

TL-FA/LF

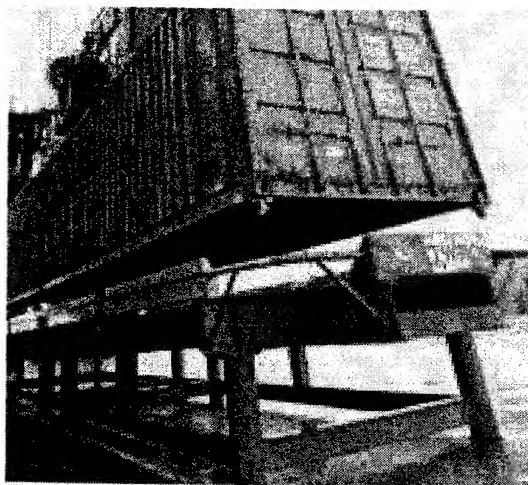


UTILITY MODEL*

Wrong inserting ist not possible because the pin interferes with corner casting.

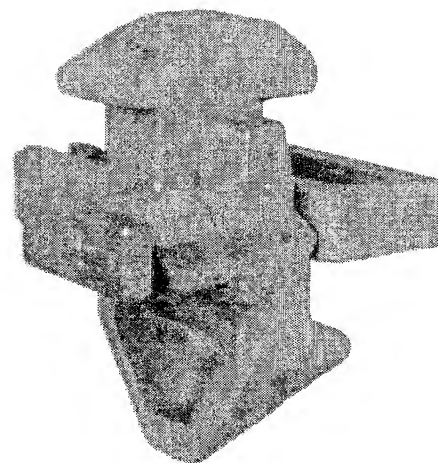
* in Germany.

DETAILS OF DIFFERENT TYPES



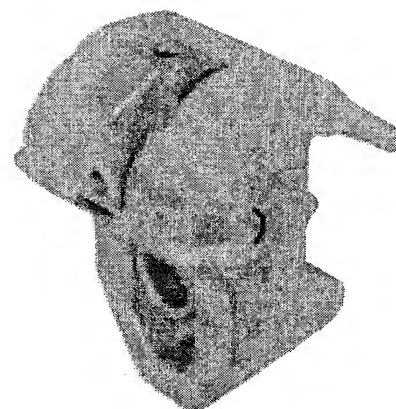
TL-FA

Handling
Maintenance
Repair



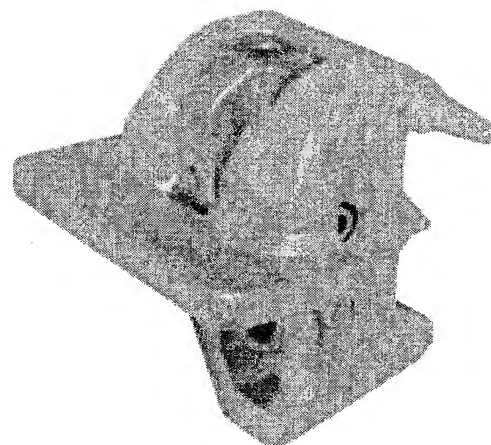
TL-FA/LF

Handling
Repair



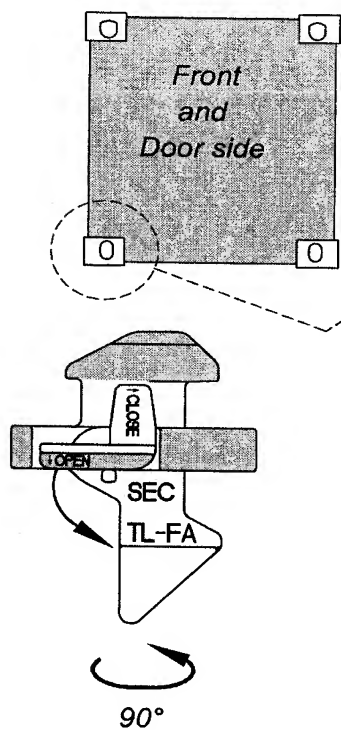
TL-FA/L

Handling
Repair

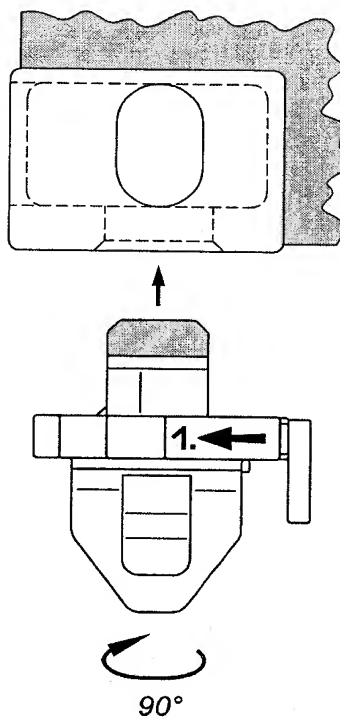


HANDLING OF TL-FA

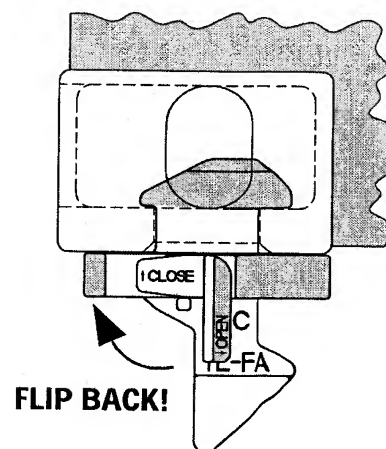
- 1** Pull the lever down in open position and turn TL-FA by 90° for inserting.



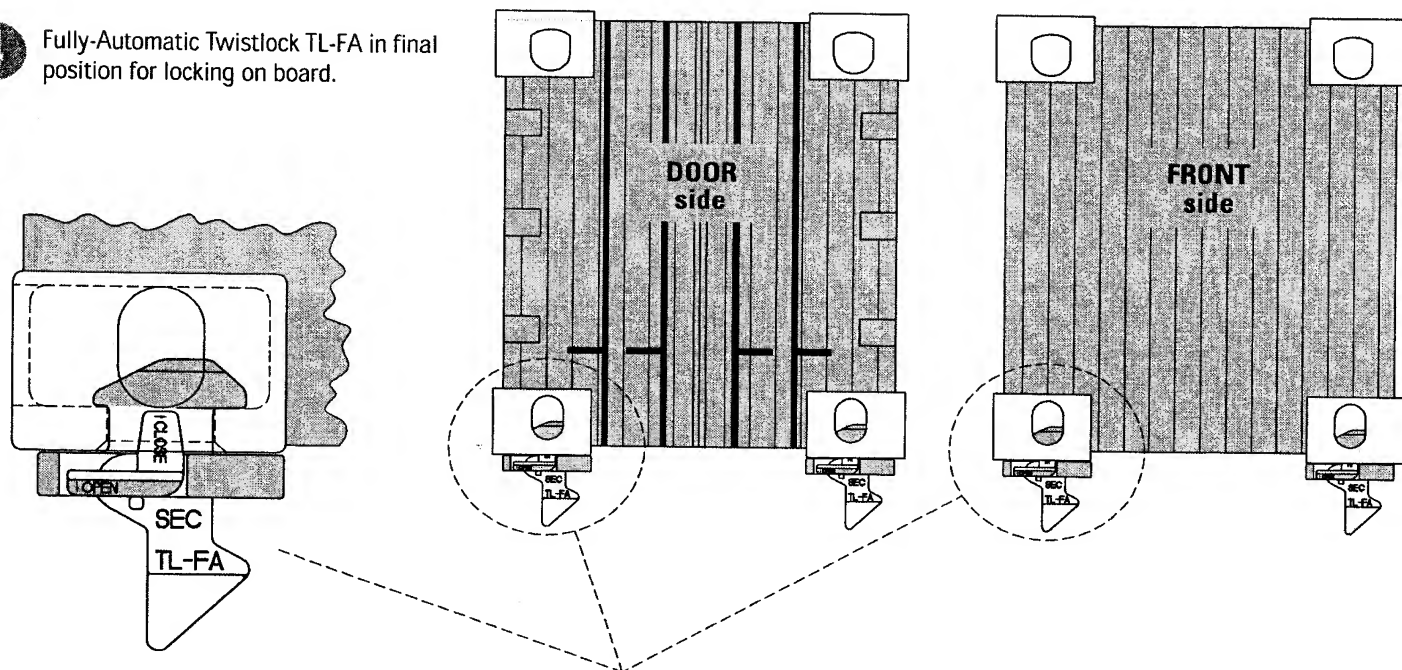
- 2** Insert into container corner and turn back by 90°.



- 3** When inside the corner casting push TL-FA backwards so that the lever flips back in locking position.



- 4** Fully-Automatic Twistlock TL-FA in final position for locking on board.

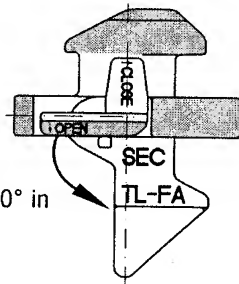


MAINTENANCE AND REPAIR OF TL-FA

How to grease the Fully-Automatic Twistlock

1

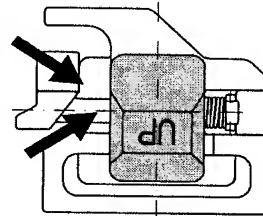
Turn the lever by 90° in open position.



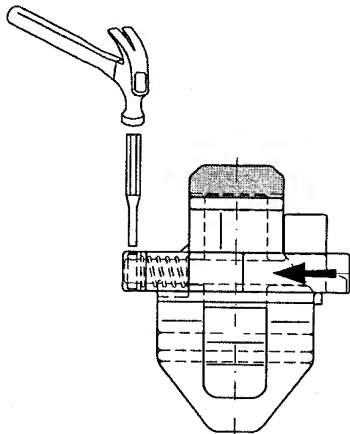
2

Grease

Grease



How to remove the Spring and the Handlever

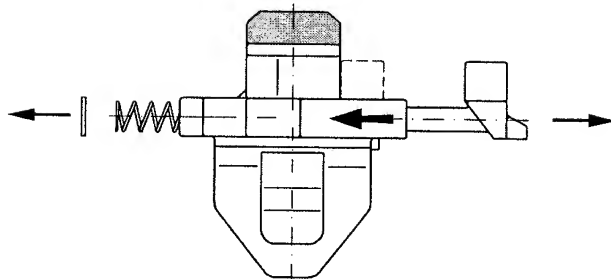


1

Punch out the double spring pin \varnothing 6mm

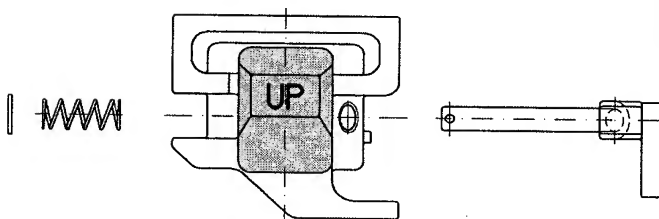
Attention:

Spring is under stress!



2

Pull out handlever, washer and spring.



3

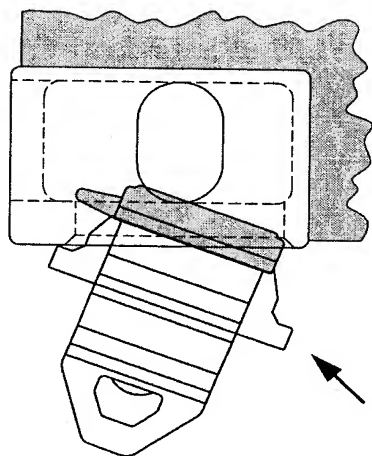
Replace broken parts

Re-assembly in opposite sequence

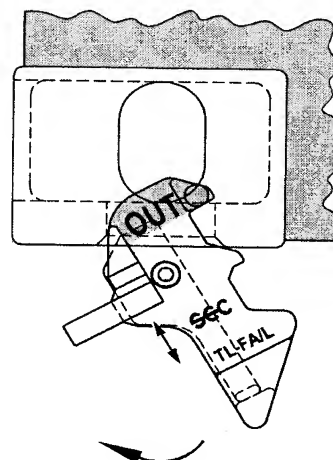
Always use new double stainless steel spring pin

HANDLING OF TL-FA/L

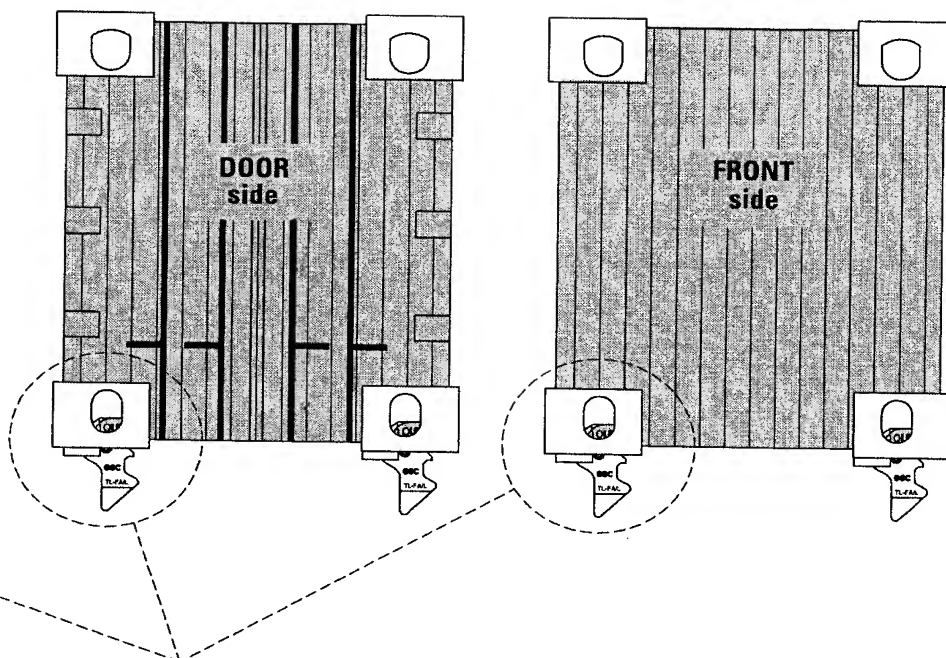
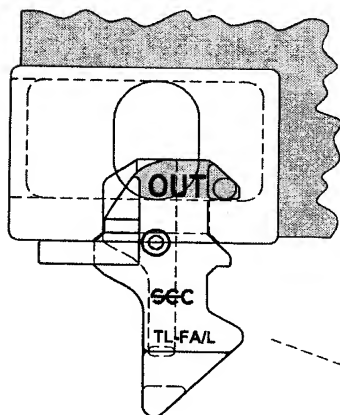
1 Insert the TL-FA/L with pin first.



2 When inside the corner casting push the TL-FA/L in vertical direction so that the slider goes up.



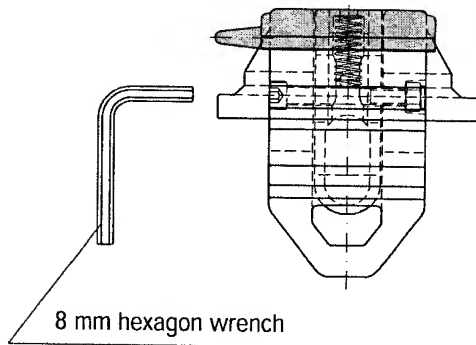
3 Fully-Automatic Twistlock TL-FA/L in final position for locking on board.



Maintenance is not required for TL-FA/L.

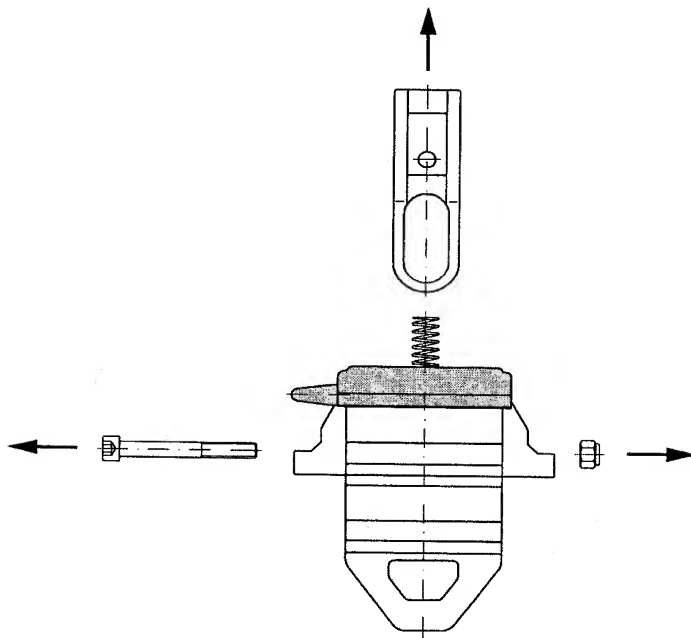
REPAIR OF TL-FAL

How to remove spring and locking device



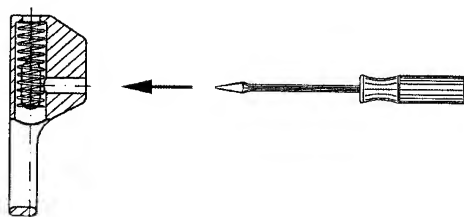
1

Release the screw M10x80.



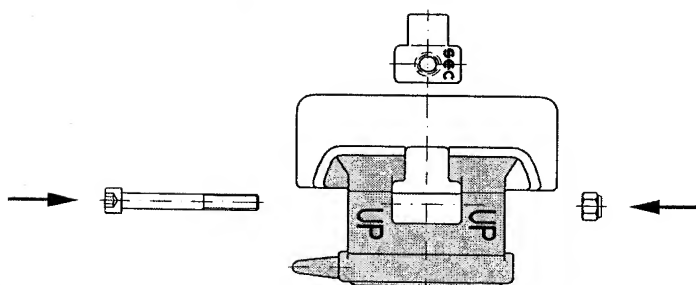
2

Pull out nut, locking device and spring.



3

Insert spring into locking device and keep under pressure by sticking a screw driver through the front hole of locking device.

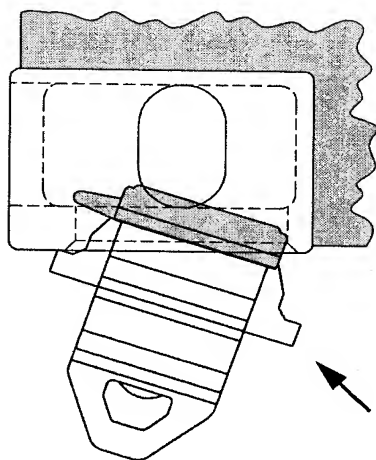


4

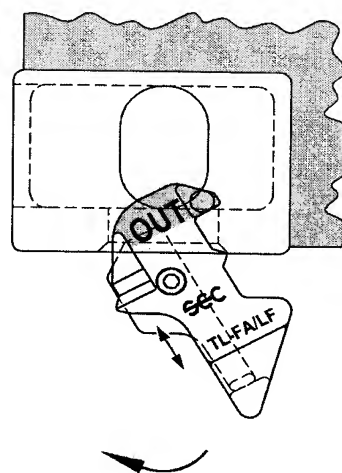
Replace broken parts and re-assembly in opposite sequence.

HANDLING OF TL-FA/LF

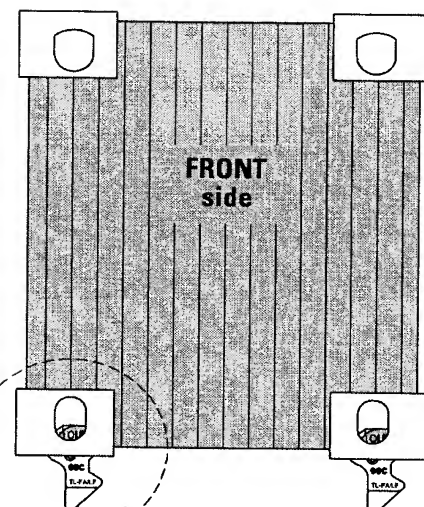
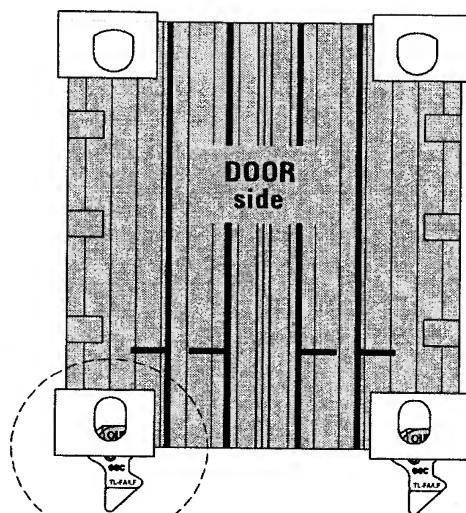
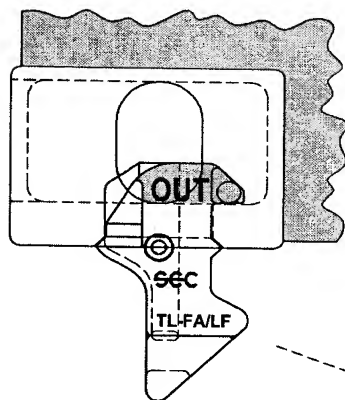
- 1** Insert the TL-FA/LF with pin first.



- 2** When inside the corner casting push the TL-FA/LF in vertical direction so that the slider goes up.



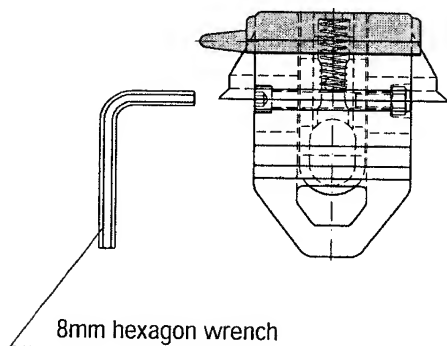
- 3** Fully-Automatic Twistlock TL-FA/LF in final position for locking on board.



Maintenance is not required for TL-FA/LF.

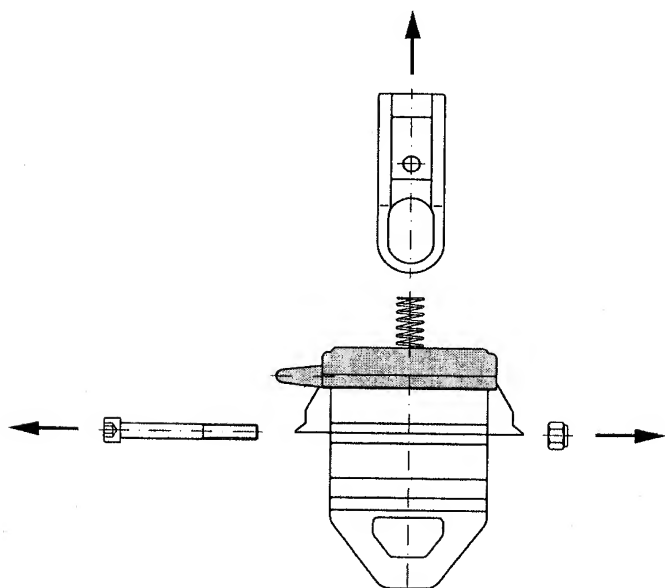
REPAIR OF TL-FA/LF

How to remove spring and locking device



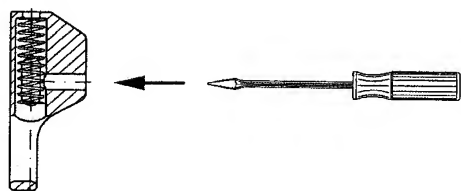
1

Release the screw M10x80.



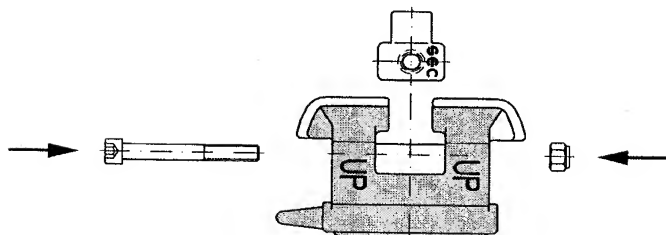
2

Pull out nut, locking device and spring.



3

Insert spring into locking device and keep under pressure by sticking a screw driver through the front hole of locking device.



4

Replace broken parts and re-assembly in opposite sequence.

SEC

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